

SECTION 8. That Article VIII, "Energy Conservation Code", is hereby repealed and re-enacted with amendments as follows:

ARTICLE VIII. ENERGY CONSERVATION CODE

DIVISION 1. GENERALLY

Sec. 5-156. Scope.

This article regulates the design and construction of the thermal envelopes and selection of HVAC, service water heating, electrical distribution systems and equipment required for the purpose of effective use of energy and shall govern all buildings and structures, or portions thereof, hereafter erected that provide facilities or shelter for human occupancy.

Secs. 5-157 – 5-160. Reserved.

DIVISION 2. TECHNICAL STANDARDS

Sec. 5-161. International Energy Conservation Code--Adopted.

The International Code Council (ICC) International Energy Conservation Code, 2009 Edition, as modified herein, is hereby adopted as the energy conservation code for the City. One (1) copy of such publication as adopted shall be maintained by the City Clerk in the office of the Council and made available for inspection by the public during regular office hours. Any amendment or change in such code promulgated by the International Code Council shall not become part of this article until the modifications have been duly adopted by ordinance. References to other ordinances and codes of the City shall be interpreted and applied in accordance with the terms and effect of such ordinances and codes at the time of such application and interpretation.

Sec. 5-162. Same--Amendments.

The ICC International Energy Conservation Code, 2009 Edition (IECC), is amended in the following respects:

Section 101.1 of the IECC is amended to read as follows:

101.1 Title. This code shall be known as the *International Energy Conservation Code of the City of Rockville*, and shall be cited as such. It is referred to herein as "this code".

Section 102.1.1 of the IECC is amended to read as follows:

102.1.1 Above code programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code if the program provides a detailed written energy analysis study demonstrating that the requirements in the program exceed all requirements of this code and includes a requirement for inspections of each building by an accredited independent party to determine compliance. Buildings approved in writing by such an energy efficiency program and that meet all mandatory provisions of this Article shall be considered in compliance with this code.

Section 107.1 of the IECC is amended as follows:

107.1 Fees: The fees shall be as established by resolution of the Mayor and Council.

Sections 107.2, 107.3, 107.4 and 107.5 of the IECC are deleted.

Section 109 of the IECC is deleted in its entirety, and replaced with the following:

109.1 Administrative Appeals. Any person aggrieved by and desirous of challenging a decision of the administrative authority in connection with the interpretation, application, or modification of any provision of this chapter relating to the manner of construction or materials used in connection with the erection, alteration, or repair of a building or structure or system installed therein, shall appeal such decision to a Board of Adjustments and Appeals. An appeal may be taken when it is claimed that:

- (1) The true intent of the code or the rules legally adopted there under have been incorrectly interpreted; or
- (2) The provisions of the code do not fully apply; or
- (3) An equally good or better form of construction can be used.

109.2 Application for appeal. An appeal shall be filed with the City Clerk within seven (7) calendar days from the date of the administrative decision being appealed, and a copy thereof shall be submitted to the Chief of Inspection Services. The appeal shall be in writing and shall contain a detailed statement of the reasons in support of such appeal.

109.3 Membership.

109.3.1. Number. The Board of Adjustments and Appeals shall consist of three (3) persons:

- a) A licensed professional engineer or architect chosen by the administrative authority;
- b) A licensed professional engineer or architect chosen by the owner of the subject building or structure; and
- c) A licensed professional engineer or architect to be jointly chosen by the other two (2) members.

109.3.2 Compensation. All fees charged by the licensed professional engineers or architects to serve on the Board shall be paid for by the person appealing the administrative decision.

109.4 Meetings and Hearings. The Board of Adjustments and Appeals shall conduct a hearing on the appeal, at which time the appellant, the appellant's representative, representatives of the City who have inspected the subject building or structure or applicable system installed therein, and any other person having knowledge of the matter or whose interests may be affected by the decision on the appeal shall be given an opportunity to be heard. The hearing shall be conducted informally, and the formal rules of evidence shall not apply. The Board may accept written testimony and shall give it such weight as it deserves.

109.4.1 Interpretation. Interpretation given provisions of the applicable ICC or NFPA Code by the International Code Council or National Fire Protection Association shall be given great deference.

109.4.2 Actions. The Board may inspect the structure or building and conduct any other investigation or research necessary in order to render a decision.

109.5 Decision. The following process shall be followed:

- (1) Within fifteen (15) working days of the hearing, the Board shall affirm, modify or reverse the decision of the administrative authority.
- (2) The agreement of any two (2) members of the Board shall constitute the decision of the Board. Failure to obtain the agreement of any two (2) members of the Board shall constitute a denial of the appeal and an affirmation of the decision of the administrative authority. The Board's findings and decision shall be rendered in writing and copies thereof shall be provided to the appellant and any other party who has entered their appearance before the Board and requested a copy of the decision. The decision may contain recommendations for remedial steps to be taken to meet the intent of the applicable code.

109.6 Appeal. Any person aggrieved by a decision of the Board of Adjustments and Appeals may appeal the decision to the Circuit Court for the County in accordance with the Maryland Rules as set forth in Title 7, Chapter 200.

Section 301.1 of the IECC is amended to read as follows:

301.1 General. Climate zone 4A shall be used for the City of Rockville in determining the applicable requirements from Chapters 4 and 5.

Section 301.2 and 301.3 of the IECC are deleted.

Section 401.2 of the IECC is amended to read as follows:

401.2 Compliance. Projects shall comply with Sections 401, 402.4, 402.5, 402.6, 402.7, and 403 (referred to as the mandatory provisions) and either:

1. Sections 402.1 through 402.3 (prescriptive); or
2. Section 405 (performance).

Table 402.1.1 of the IECC is amended to read as follows:

**TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT ^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKY-LIGHT U-FACTOR ^b	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^c	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^e WALL R-VALUE
4A	0.35	0.60	0.45NR	4938	20-13 or 13+5 ^e	10/125/ 10	19	10 / 13	10, 2ft	10 / 13

For SI: 1 foot = 304.8 mm.

a. R values are minimums. U factors and SHGC are maximums. R 19 shall be permitted to be compressed into a 2 x 6 cavity.

b. The fenestration U factor column excludes skylights. The SHGC column applies to all glazed fenestration.

c. The first R value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.

d. R 5 shall be added to the required slab edge R values for heated slabs.

e. Any combination of insulation shall be permitted to meet the requirements by summing the R value of the cavity insulation and the R value of the insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of the exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

Table 402.1.3 of the IECC is amended to read as follows:

**TABLE 402.1.3
EQUIVALENT U-FACTORS ^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKY-LIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
4	0.35	0.60	0.02030	0.056082	0.141	0.047	0.059	0.065

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

Section 402.1.5 of the IECC is added to read as follows:

402.1.5 Envelope component descriptions and default values. When calculating the U-factor of an assembly as part of Section 402.1.3, 402.1.4, or 404.5.2, the values in Tables 402.1.5.1 through 402.1.5.3 shall be used unless alternate values are approved by the code official. In addition, the U-factor of the assembly shall be calculated using a series-parallel calculation with the default framing fractions in Tables 402.1.5.1 through 402.1.5.3. Subject to approval by the code official, the frame fractions for the proposed design shall be permitted to be determined by the type of construction (Satisfactory, Intermediate or Advanced) as defined in Sections 402.1.5.1 through 402.1.5.3.

402.1.5.1 Wood stud frame walls. The type of construction (Satisfactory, Intermediate or Advanced) for determination of default framing fractions in wood stud frame walls are defined as follows:

Satisfactory Insulation and Framing Fractions:

Satisfactory wood stud frame walls include studs framed on 16-inch centers with double top plate and single bottom plate. Corners use three studs and each opening is framed using two studs.

Studs and plates: 21%

Insulated cavity: 75%

Headers: 4%

Intermediate Insulation and Framing Fractions:

Intermediate wood stud frame walls include studs framed on 16-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and each opening is framed by two studs.

Studs and plates: 18%

Insulated cavity: 78%

Headers: 4%

Advanced Insulation and Framing Fractions:

Advanced wood stud frame walls include studs framed on 24-inch centers with double top plate and single bottom plate. Corners use two studs or other means of fully insulating corners, and one stud is used to support each header.

Studs and plates: 13%

Insulated cavity: 83%

Headers: 4%

TABLE 402.1.5.1
FRAME WALL COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.68	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 83 %	Framing: 17 %
Proposed Design Default Insulation / Framing Fraction	Insulation: 78%	Framing: 22%
Insulating Sheathing Layer R-Value	0 or as installed	
Structural Sheathing Layer R-Value	0.62	
Siding Layer R-Value	0.61	
Exterior Air Film R-Value	0.25	

402.1.5.2 Wood frame floors. The type of construction (Satisfactory, Intermediate or Advanced) for determination of default framing fractions in wood frame floors are defined as follows:

Satisfactory Insulation and Framing Fractions: Satisfactory wood floors include open joist systems framed 12-inch centers or solid joists framed 16-inch centers.

Framing: 12%

Insulated cavity: 88%

Intermediate Insulation and Framing Fractions: Intermediate wood floors include open joist systems framed 16-inch centers or solid joists framed 20-inch centers.

Framing: 10%

Insulated cavity: 90%

Advanced Insulation and Framing Fractions: Advanced wood floors include open joist systems framed 20-inch centers or joists framed 24-inch centers.

Framing: 8%

Insulated cavity: 92%

TABLE 402.1.5.2
FLOOR COMPONENT DEFAULT VALUES

Component	Default Value	
Interior Air Film R-Value	0.92	
Floor Covering R-Value	1.23	
Floor Subfloor R-Value	0.94	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 92%	Framing: 8%
Proposed Design Default Insulation / Framing Fraction	Insulation: 90%	Framing: 10%
Exterior Air Film R-Value	0.92	

402.1.5.3 Wood frame ceilings. The type of construction (Satisfactory, Intermediate or Advanced) for determination of default framing fractions in wood frame ceilings are defined as follows:

Satisfactory Insulation and Framing Fractions:

Satisfactory ceiling insulation and framing assumes tapering of insulation depth around the perimeter with resultant decrease in thermal resistance. An increased R-value is assumed in the center of the ceiling due to the effect of piling leftover insulation.

Framing: 11%

Insulated cavity: 89%

Intermediate Insulation and Framing Fractions:

Intermediate ceiling insulation and framing assumes tapering of insulation depth around the perimeter with resultant decrease in thermal resistance. An increased R-value is assumed in the center of the ceiling due to the effect of piling leftover insulation.

Framing: 9%

Insulated cavity: 91%

Advanced Insulation and Framing Fractions:

Advanced ceiling insulation and framing assumes full and even depth of insulation extending to the outside edge of exterior perimeter of the ceiling.

Framing: 7%

Insulated cavity: 93%

**TABLE 402.1.5.3
CEILING COMPONENT DEFAULT VALUES**

Component	Default Value	
Interior Air Film R-Value	0.61	
Drywall Layer R-Value	0.45	
Cavity Layer R-Values	Insulation: As Specified	Framing: R-1.25 per inch of wood
Standard Reference Design Insulation / Framing Fraction	Insulation: 93%	Framing: 7%
Proposed Design Default Insulation / Framing Fraction	Insulation: 91%	Framing: 9%
Exterior Air Film R-Value	0.61	

Sections 402.2.1, 402.2.2, 402.3.3 and 402.3.4 of the IECC are deleted.

Section 402.6 of the IECC is added to read as follows:

402.6 Minimum opaque envelope requirements (Mandatory). The thermal requirements for individual opaque envelope components shall not be less than the requirements in Table 402.7-6 when determining alternatives to the R-values in Table 402.1.1 under Sections 402.1.3, 402.1.4, or 404.

Table 402.6 of the IECC is added to read as follows:

**TABLE 402.6
MINIMUM INSULATION REQUIREMENTS BY COMPONENT**

CLIMATE ZONE	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE	STEEL FRAME WALL R-VALUE ^a	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE AND DEPTH	CRAWL SPACE WALL R-VALUE
4A	30	11	4	R-11+3	13	5/11 ^b	5, 2ft	5/11 ^b

a. Cavity Insulation R-value is listed first, followed by continuous insulation R-value.

b. The first R-value applies to continuous insulation, the second to framing cavity insulation; either insulation configuration meets the requirement.

Section 402.7 of the IECC is added to read as follows:

402.7 Moisture control. (Mandatory). The building design shall not create conditions of accelerated deterioration from moisture condensation. Above-grade frame walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder. The vapor retarder shall be installed on the warm-in-winter side of the thermal insulation.

Exceptions:

1. In construction where moisture or its freezing will not damage the materials.
2. Frame walls, floors and ceilings in jurisdictions in Zone 4. (Crawl space floor vapor retarders are not exempted.)
3. Where other approved means to avoid condensation are provided.

Section 403.4 is deleted in its entirety and replaced to read as follows:

403.4. Service water heating. Service water heating systems and piping shall be installed in accordance with the applicable requirements of Sections 403.4.1.1 through 403.4.1.2.

403.4.1 Insulation. All Service Hot Water piping shall be insulated to at least R-2 for pipes sized 1" in diameter or less and R-4 for pipes larger than 1" in diameter for the distance between the service water heater to within 5 feet of each fixture connected to the hot water pipe.

Exception: Hot water distribution systems not located below ground or located in a mass floor or mass wall in contact with ground that supply hot water from condensing gas service water heating equipment, from instantaneous service electric or gas water heating equipment or from heat pump electric service water heating equipment.

403.4.2 Circulating hot water systems. All circulating service hot water piping shall be insulated to at least R-2 for pipes sized 1" in diameter or less and R-4 for pipes larger than 1" in diameter. Circulating hot water systems shall include an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

403.4.3 Stub-in for solar water. All service water heating distribution systems for new work or renovations where interior finishes are to be removed shall have an identified stub-in connection point for future Solar Hot Water Systems in an accessible location with an access panel within 5 feet of the roof with an access panel and identified. Installation of solar hot water heating systems shall comply with Section M2301 of the International Residential Code.

Section 403.6 of the IECC is amended to read as follows:

403.6 Equipment sizing (Mandatory). Heating and cooling equipment shall be sized in accordance with this section and Table 403.6.

Table 403.6 is added to the IECC to read as follows:

**TABLE 403.6
HEATING AND COOLING EQUIPMENT SIZING**

UNIT	MAXIMUM OVERSIZING PERCENTAGE^{1,2}	MINIMUM EFFICIENCY & TESTING PROCEDURE
Air Conditioners	15%	Table 503.2.3(1)
Multispeed ³ Air-Source Heat Pumps and Ground- Source Heat Pumps	15%	Table 503.2.3(2)
Single-speed Ground Source Heat Pumps	25%	Table 503.2.3(2) or Table 503.2.3(3)
All fuel-fired heating appliances	40%	Table 503.2.3(4) or Table 503.2.3(5)

Notes:

1. Equipment shall be sized in accordance with ACCA Manual J:
 - a. Indoor and outdoor coils shall be matched for size;
 - b. Outdoor temperatures shall be the 99.0% and 1.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the most representative city for which design temperature data are available;
 - c. Indoor temperatures shall be 75 F for cooling and 72 F for heating;
 - d. Infiltration rate shall be assumed as 0.00036 Specific Leakage Area (SLA).
2. Once the appropriate equipment size is determined, if that specific size does not exist, the next larger size of manufactured equipment shall be acceptable, regardless of the percentage listed.
3. Multi-speed units shall be permitted to exceed the listed percentage only to the cooling capacity necessary to control humidity levels.

Section 404 of the IECC is deleted in its entirety, and replaced with the following:

404 Electrical power and lighting systems.

404.1 Scope. This section applies to lighting equipment, related controls and electric circuits serving the interior spaces and exterior building facades of all residential buildings including accessory structures and garages. Certification of fixture used shall be included on sticker per Section 401.3.

404.2 Lighting Equipment. A minimum of fifty percent (50%) of the lamps in permanently installed lighting fixtures shall be high efficacy lamps.

Table 405.5.2 (1) of the IECC is amended to read as follows:

TABLE 405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3 Solar absorptions = 0.75 Remittance = 0.90	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified As proposed As proposed
Basement and crawlspace walls	Type: same as proposed Gross Area: same as proposed U-Factor: from Table 402.1.3, with insulation layer on interior side of walls	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified
Above-grade floors	Type: wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified
Ceilings	Type: wood frame Gross Area: same as proposed U-Factor: from Table 402.1.3	As proposed As proposed As proposed, assuming gaps/missing insulation equal to 5%, unless otherwise verified
Roofs	Type: composition shingle on wood sheathing Gross area: same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
Attics	Type: vented with aperture = 1 ft ² per 300 ft ² ceiling area	As proposed
Foundations	Type: same as proposed	As proposed
Doors	Area: 40 ft ² Orientation: North U-factor: same as fenestration from Table 402.1.3	As proposed As proposed As proposed
Glazing ^a	Total area _g = (a) The proposed glazing area; where the proposed glazing area is less than 18 <u>15</u> % of the conditioned floor area (b) 18 <u>15</u> % of the conditioned floor area; where the proposed glazing area is 18 <u>15</u> % or more	As proposed

	<p>of the conditioned floor area</p> <p>Orientation: equally distributed to four cardinal compass orientations (N, E, S, & W)</p> <p>U-factor: from Table 402.1.23</p> <p>SHGC: From Table 402.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used</p> <p>Interior shade fraction:</p> <p>Summer (all hours when cooling is required) = 0.70</p> <p>Winter (all hours when heating is required) = 0.85</p> <p>External shading: none</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>Same as standard reference design^c</p> <p>As proposed</p>
Skylights	None	As proposed
Thermally isolated sunrooms	None	As proposed
Air exchange rate	Specific Leakage Area (SLA) ^d = 0.00036 assuming no energy recovery	<p>For residences that are not tested, the same as the standard reference design</p> <p>For residences without mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate^e but not less than 0.35 ACH</p> <p>For residences with mechanical ventilation that are tested in accordance with ASHRAE 119, Section 5.1, the measured air exchange rate^e combined with the mechanical ventilation rate,^f which shall not be less than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area N_{br} = number of bedrooms</p>
Mechanical ventilation	<p>None, except where mechanical ventilation is specified by the proposed design, in which case:</p> <p>Annual vent fan energy use: kWh/yr = $0.03942 \times CFA + 29.565 \times (N_{br} + 1)$</p> <p>where: CFA = conditioned floor area N_{br} = number of bedrooms</p>	As proposed
Internal gains	IGain = $17,900 + 23.8 \times CFA + 4104 \times N_{br}$ (Btu/day per dwelling unit)	Same as standard reference design
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area	Same as standard reference design, plus any additional mass specifically designed as a thermal storage element ^g but not integral to the building envelope or

		structure
Structural mass	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air For masonry basement walls, as proposed, but with insulation required by Table 402.1.3 located on the interior side of the walls For other walls, for ceilings, floors, and interior walls, wood frame construction	As proposed As proposed As proposed
Heating systems ^{h,i}	Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum efficiency Nonelectric furnaces: natural gas furnace with prevailing federal minimum efficiency Nonelectric boilers: natural gas boiler with prevailing federal minimum efficiency Capacity: sized in accordance with Section M1401.3 of the <i>International Residential Code</i>	As proposed As proposed As proposed As proposed As proposed
Cooling systems ^{h,j}	Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards Capacity: sized in accordance with Section M1401.3 of the <i>International Residential Code</i>	As proposed As proposed As proposed
Service Water Heating ^{h,k}	Fuel type: same as proposed design Efficiency: in accordance with prevailing Federal minimum standards Use: gal/day = $30 + 10 \times N_{br}$ Tank temperature: 120°F	As proposed As proposed Same as standard reference Same as standard reference
Thermal distribution systems	A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. For tested duct systems, the leakage rate shall be the applicable maximum rate from Section 403.2.2.	As tested or as specified in Table 404.5.2(2) if not tested.
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature set point = 70 °F	Same as standard reference

For SI: 1 square foot = 0.93 m²; 1 British thermal unit = 1055 J; 1 pound per square foot = 4.88 kg/m²; 1 gallon (U.S.) = 3.785 L; °C = (°F-32)/1.8.

a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening

is less than 50% of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

b. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$$AF = A_s - FA - F$$

where:

AF = Total glazing area.

A_s = Standard reference design total glazing area.

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).

F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater, and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

c. For fenestrations facing within 15 degrees (0.26 rad) of true south that are directly coupled to thermal storage mass, the winter interior shade fraction shall be permitted to be increased to 0.95 in the proposed design.

d. Where Leakage Area (L) is defined in accordance with Section 5.1 of ASHRAE 119 and where:

$$SLA = L/CFA$$

where L and CFA are in the same units.

e. Tested envelope leakage shall be determined and documented by an independent party approved by the code official. Hourly calculations as specified in the 2001 ASHRAE *Handbook of Fundamentals*, Chapter 26, page 26.21, Equation 40 (Sherman-Grimsrud model) or the equivalent shall be used to determine the energy loads resulting from infiltration.

f. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals* page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.

g. Thermal Storage Element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

h. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

i. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design. For electric heating systems, the prevailing federal minimum efficiency air-source heat pump shall be used for the standard reference design.

j. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

k. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum Energy Factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

Section 501.1 and 501.2 of the IECC is amended to read as follows:

501.1 Scope. The requirements contained in this chapter are applicable to all commercial buildings, or portions of commercial buildings. These commercial buildings shall meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings.

Exception: Low-rise residential buildings.

501.2 Application. Buildings less than 100,000 square feet shall have the alternative option to meet the requirements of the New Building Institute *Core Performance Guide*. Office buildings less than 20,000 square feet shall have the alternative option to meet the requirements of the *ASHRAE Advanced Energy Design Guide for Small Office Buildings*. Retail buildings less than 20,000 square feet shall have the alternative option to meet the requirements of the *ASHRAE Advanced Energy Design Guide for Small Retail Building*. K-12 Schools shall have the alternative option to meet the requirements of the *ASHRAE Advanced Energy Design Guide for K-12 School Building*. Warehouses and Self Storage buildings less than 50,000 square feet shall have the alternative option to meet the

requirements of The ASHRAE 30% Advanced Energy Design Guide for Small Warehouses and Self Storage Buildings.

Sections 502, 503, 504, 505 and 506 of the IECC are deleted in their entirety.

Secs. 5-163 – 5-170. Reserved.